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ABSTRACT

This working paper presents the background, justification, and development plan for a kindergarten program to identify and correct deficits in prereading skills. The program provides for individual differences in: (a) patterns of skill deficits, (b) rates of learning, and (c) degrees of assistance required. It is intended for optimal use in the multiunit elementary school organization, permitting the planning of individually guided instruction with flexible groupings of staff and students; it is adaptable, however, to a variety of other school organizations. A three-year research and development plan incorporating pilot and small-scale field testing is proposed. At the end of that period, a full-year program would be ready for large-scale field testing. (Author)

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Working Paper No. 78

AN INSTRUCTIONAL PROGRAM IN PREREADING SKILLS: NEEDS AND SPECIFICATIONS

Richard L. Venezky and Robin S. Chapman

Report from the Basic Prereading Skills:
Identification and Improvement Element of the Project
on Reading and Related Language Arts

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This Working Paper is from the Basic Prereading Skills Project, which is part of the Reading and Related Language Arts Project, in Program 2, Processes and Programs of Instruction. The objectives are to develop curriculum materials for elementary and preschool children, to develop related instructional procedures, and to test and refine the instructional programs incorporating the curriculum materials and instructional procedures. Contributing to these objectives, this project has two general objectives: (a) to develop kindergarten-level tests for diagnosing deficits in skills which relate to reading, and (b) to develop a kindergarten-level program for teaching these skills. Tests and instructional programs will be developed for: visual and acoustic skills, including letter and letter string matching with attention to order, orientation and detail; auditory matching, segmentation, and blending; and relating sounds to symbols.

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Abstract

This working paper presents the background, justification, and development plan for a kindergarten program to identify and correct deficits in prereading skills.

In the introduction the extent of reading failure and current remedies for it are considered. Current knowledge about the reading process, the acquisition of reading ability, and prereading skills are outlined and the criteria for selection of prereading skills discussed. From this review emerges a justification for concentrating on specific visual and auditory skills. These two skill areas are then considered in detail, including evidence for skill deficits, sources of deficits, and teachability of skills in kindergartners.

In the final section of the paper, a kindergarten program for identifying and correcting skill deficits is proposed. The program provides for individual differences in: (a) patterns of skill deficits, (b) rates of learning, and (c) degrees of assistance required. It is intended for optimal use in the multiunit elementary school organization, permitting the planning of individually guided instruction with flexible groupings of staff and students; it is adaptable, however, to a variety of other school organizations. A three-year research and development plan incorporating pilot and small-scale field testing is proposed. At the end of that period, a full-year program would be ready for large-scale field testing.

I

BACKGROUND

Introduction

This paper presents the justification, background and development plan for a program which attempts to overcome reading skill deficits at the kindergarten level. The program will not teach reading in kindergarten, but will prepare children so that they are ready to learn to read when they enter first grade. One stimulus for this work is the knowledge that large numbers of children--and especially those from disadvantaged families--do not learn to read adequately today. A second is the observation that after nearly 80 years of research on the reading process and on reading failure we have almost no reason to doubt that with proper training a significant number of these reading failures can be avoided.

We cannot prove, and do not attempt to prove, that the program proposed here will solve America's reading problems. We can only show that based upon current knowledge of the reading process, such a program has a high chance of succeeding, that it is compatible with current educational practices, and that its costs are bearable. An additional feature of this program--although hardly sufficient to justify

development expenditures--is that even in failing to overcome all reading difficulties, the program would make a significant contribution to our understanding of reading failure, since it would have demonstrated that many skills which are now considered important for reading are not by themselves sufficient guarantors of reading success.

Reading Failure

The failure of a significant portion of grade school children to learn to read adequately has been documented for the United States as well as for most other literate societies.[1] Eisenberg (1966), for example, reports that in a large city in the Eastern United States, an administration of the Stanford Reading Test to 12,000 sixth graders in 1964 showed 27.5% of those tested to be two or more years behind the national norm, while almost 85% were one year or more behind. A Ministry of Education report in England (Ministry of Education, 1956) states that approximately 21% of the 15-year-olds there could be described as backward readers and another 4% as semi-literate. Walcutt (1961) reports comparable figures for the United States, based upon different subject populations and testing instruments.

Even more disturbing than the overall failure rate, however, are disproportionately high failure rates for disadvantaged children, especially those from certain minority groups. For example, in the study reported by Eisenberg, 12% of the whites but 36% of the Negroes

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[1]The one exception is a report from Japan (Makita, 1968), which claims that the reading failure rate there is less than 1%. However, this result is based upon a questionnaire mailed to teachers in metropolitan Tokyo and is highly suspicious when viewed in relation to the reading problems reported in the Journal of the Japanese Reading Society.

were two or more grade levels behind in reading. Stemmler (1966) reports an even higher failure rate for Mexican-American children in the first year of reading instruction in Texas, and Coleman's summaries (Coleman, 1966) indicate similar deficits for American Indians. Whatever the exact failure rates and whatever their source, it is clear that an important segment of the school population is not learning to read adequately and that a disproportionate number of disadvantaged children are in this group.

Remedies for Reading Failure

These facts are not revelations; reading failure has been an educational and public concern since at least the Classical Period in Greece.[2] But reading pedagogy has been derived as much from revelation as from experimentation or observation, and the most common remedy for the reading malaise has been to change teaching programs. The ABC method, which dominated reading instruction from antiquity to the twentieth century, gave way to whole word procedures, which in turn succumbed to phonics, a misrepresentation of the relation between orthography and speech. When phonics faltered, a host of new but equally unsubstantiated procedures sprang up, bearing titles like i.t.a., linguistics, and experiential methods. Rarely were these methods based upon new understandings of reading or of learning; instead, they derived mostly from popular discontent with existing procedures,

[2] Huey (1908 reissue), for example, writes of a concerned Greek father who purchased 24 slaves as playmates for a slow-learning son, giving each one a letter name. On the history of reading instruction, see Mathews, 1966.

mixed with a desire to find instant solutions. Each succeeded in teaching reading to a significant portion of the total school enrollment, but each failed in improving the educational achievements of those who needed help the most--the underprivileged and the slow learners.[3] Perhaps the most serious indictment of current methodologies is that reading failures by the end of first or second grade, regardless of teaching method, can be predicted with reasonable accuracy by tests at the kindergarten level (deHirsch, Jansky, & Langford, 1966; Wilson & Flemming, 1939). That is, we can identify at an early age children who require special help in learning to read, but we have yet to develop effective procedures for helping them.

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[3] Bond and Dykstra (1967), for example, found in a study of data from over 4,000 first grade children that neither method of teaching reading, the teacher's experience, nor the teacher's capabilities was a significant variable in predicting reading success.

II

HOW CHILDREN LEARN TO READ

Introduction

Both the nature of the reading process and the proper methods for inducing literacy in the young have been controversial issues for at least the last 60 years. The research literature on these topics continues to appear at such an enormously high rate that a clearinghouse recently established to index and disseminate it has nearly been inundated.[4] Prior to approximately 1910, the reading process was a vital psychological issue and the competition between experimenters and laboratories produced data that in some instances remain as primary sources of knowledge. But with the rise of educational psychology under Thorndike, psychologists turned away from applied research, leaving to educators and the educational psychologists the dual tasks of devising classroom tests and procedures on one hand while developing an adequate theoretical basis for reading on the other. The result was a rapid decline in basic

[4] The ERIC Clearinghouse for Reading is described in Summers (1968).

research, a decline that was lamented up to the late 1950's when psychologists returned actively to investigations of the reading process.

Vernon, for example, wrote in 1931 that "there has been little experimental work since the publication of Huey's Psychology and Pedagogy of Reading [1908] upon adult perception in reading, and the majority of the work upon children's perception in reading, though possibly of much pedagogical value has been too disconnected and uncontrolled to provide results of much reliability or psychological interest" (Vernon, 1931, p. xiv). The same could be said up to almost 1960 for most areas related to reading. Over the past ten years, however, reading research has once again become a prospering concern; it is one of the high priority targeted areas for investment by the U.S. Office of Education, and it sports several journals of its own and an international society (the IRA) with over 50,000 members.

Recent research on reading has led to the hypotheses that reading is not a single global or maturational skill, but a complex of skills, and that reading failure can be prevented through the detection and correction of specific skill deficits. Levin (1966), in discussing reading research, wrote: "To think of reading as a complex skill is to borrow an analogy from the research on other skill-learnings in which the total process is analyzed into component parts" (p. 139).

The application of the skill approach to the prevention of reading failure was outlined recently by Hirst. "If variables that

are associated with successful learning to read experiences can be identified, the instructional programs can be structured to emphasize these areas. Children who fail to possess certain success attributes can be identified and assistance can be provided to them to overcome their deficiencies, or the learning program can be adapted to their specific strengths or weaknesses. This identification and adaptation can be done prior to failure, not after it" (Hirst, 1969, p. 9).

While the renewed enthusiasm for reading research, and skill-oriented research in particular, has not achieved a consensus on which skills are essential, it has re-established an interest in understanding the reading process and the procedures through which it is acquired.

Components of the Reading Process

The sketch which follows is intended to be an outline of what has been established about the reading process and how it is acquired. A more extensive analysis of the current literature is in preparation.[5]

Reading is defined here as translation from writing to a form of language from which the reader already derives meaning.[6] Studies of letter-sound learning recently done in Finland (Finnish) and Israel (Hebrew), where the relationships of letters to sounds are

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[5] R. Venezky, Theoretical and experimental bases for teaching reading. In T. Sebeok (Ed.), Current trends in linguistics, Vol. 12. New York: Humanities Press, in press.

[6] On this definition see further Venezky, Calfee, & Chapman, 1969.

highly predictable, show that at least two major processes enter into learning to read.[7] The first is composed of those items which lead up to and include word recognition: scanning and fixating, visual recognition of letters and words, and letter-sound translation. Failure to master these leads to failure in the second process--comprehension of connected text—but success in the first does not guarantee success in second. For the mature reader there is no clear separation of reading processes; scanning, fixating, recognizing and comprehending appear to be interrelated. (Letter-sound translation is infrequently used by mature readers.) More extensive discussions of the processes involved are available in Venezky (in press) and Anderson and Dearborn (1952).[8]

Development of Reading Related Skills of the Prereader

Understanding the Task. Some children enter reading instruction with a well-formed concept of what reading is all about; they recognize many of the letters by name, know a few words by sight, and may attempt to sound out sentences. These children will learn to read under almost any teaching method, even one centered upon the local telephone directory. But the average child does not enter the reading situation so well equipped. More often than not he is unaware of either the purpose or the nature of reading; he does not know that letters represent sounds, and that these sounds can be blended into

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[7] To be published in a forthcoming R & D Center technical report.

[8] Comprehension, however, is only briefly discussed in these sources and remains as a relatively unexplored area.

words and words into meaningful sentences. Even the terms word, sound, and sentence are confusing to him (Downing, 1970). An example of this orientation toward reading has been described by Reid (1966), who interviewed children during their first year of reading instruction in Scotland: ". . .reading, prior to the experience, is a mysterious activity to which they [the children] come with only the vaguest of expectancies. In some cases the children . . . were not even clear whether one 'read' the pictures or the other 'marks' on the paper" (p. 60).

Language Skills. Although children come to the reading task with differing experiences and expectations, almost all can use language to communicate with adults and with peers. Articulation errors, though still occurring at the age of six, particularly for certain consonants, are mostly motor development problems and are not indicators of reading problems. Phonemic discrimination is also well-developed at the first grade level, as adequate testing will reveal, even for those so cavalierly classed as "verbally deprived."[9] Morphology, syntax, and vocabulary continue to develop beyond this level, yet all three are sufficiently developed here to allow the child to express his immediate needs and impressions. Reading

[9] Blank (1968a), for example, reports "Our research . . . has indicated that deprived children do not lack perceptual experience or perceptual skills, but rather lack the means for making these observations meaningful" (p. 1). Phonemic discrimination deficits are reported for many deprived children (Deutsch, 1964) and are often cited as a factor leading to reading failure, but Rudegeair and Kamil (1970), as well as Berlin and Dill (1967) have shown that it is the task involved with the standard discrimination test and not discrimination per se that generally leads to low scores. On the so-called phonemic discrimination deficit in culturally disadvantaged Israeli children, see Blank (1968b).

problems related to morphology, syntax, and vocabulary often result, however, from the failure of instructors and text book writers to estimate accurately the level of development of each of these skills at various ages.

The child's ability to use language for communication presents tactical problems for the teaching of reading--selection of appropriate language forms and designation of what words must be taught orally before instruction begins. But the child's ability, or lack thereof, to manipulate meaningless speech sounds is a far more serious concern and has been identified as a crucial reading variable in a number of different cultures. At some point in almost all reading programs, sounds are treated as individual units which the child must manipulate, as in rhyming, matching of words by initial or final sounds, or attaching sounds to letters and blending them into words. These tasks, for reasons that are still not understood, are difficult for many children at the kindergarten and first grade levels. Zhurova (1963) reports that Russian children still have trouble at the age of seven in isolating the initial sound of a word, especially if the sound is a stop. Bruce (1964) tested British children on their abilities to remove a medial sound from a word to produce a second word (e.g., eliminating [t] from stand to give sand) and found that below the mental age of seven they could not learn the task. Schenk-Danzinger (1967) reports similar results in Austria as do Calfee, Chapman, and Venezky (in press) in the United

States. Once children learn to represent sounds with letters, these difficulties seem to disappear, but so far little work has been reported on attempting to teach these skills to prereaders.

Perceptual and Cognitive Skills. For the average child the perceptual and cognitive demands of initial reading instruction, aside from sound abstraction, are not excessive. At the kindergarten level children can match letters of the alphabet, although left-right reversals (e.g., confusing English lower case b and d) are common, as are order errors for matching letter strings.[10] Most other skills required for learning initial reading appear to be available by the end of kindergarten, even in those children from lower socioeconomic environments. Some skill deficits, however, such as those associated with sound manipulation and visual word identification, appear to be more drastic in the lower socioeconomic children.

Letter-Sound Generalizations. Letter-sound generalizations are important for learning to read alphabetic or syllable writing systems, although their use does not by itself guarantee competent reading behavior. Their primary function is to facilitate the development of word recognition ability, which they do by providing a means for (a) checking the identification of a word previously encountered, but still not known well enough to be identified with high confidence from its visual features or from context, and (b) generating the pronunciation of words not encountered before in print, but which may be in the reader's

[10] For example, identifying ersh with hsre or was with saw.

listening vocabulary.

For either of these aids, perfectly predictable correspondences are not necessary because in both situations the reader has other cues to work with; the pronunciation of the printed form must only approximate in most circumstances the actual pronunciation for the appropriate match to be made. For example, in the sentence "The cowboy leads the horse into the street", the word leads may, if not recognized by sight or context, be pronounced [lɛdz] initially, but if the reader is aware of the preceding context (and speaks a standard brand of English), he will probably recognize that this is not the correct form and try another pronunciation. Observations of children reading aloud show exactly this process at work. Without the ability to approximate sound from spelling the child would be dependent upon other readers for substantiating his word identifications and consequently would develop this ability quite slowly.

The major difficulty in learning letter-sound correspondences appears to be in the acoustical domain: the storage and retrieval of the response. Blending of sounds into words, however, is also a relatively difficult task. Children can learn arbitrary symbol-sound pairs easily if the response is a concrete noun, but not if the response is a function word or meaningless sound. Proper mediation can aid letter-sound learning, but it has not been established that the best letter-sound learning procedure is more efficient than the best analytic method (starting with whole words, then teaching letters

and sounds). Observations of teaching methods indicate that letter-sound learning occurs fastest for mediators which produce the desired response (e.g., the letter b is associated with a fish which says /b/-/b/-/b/), next best for mediators which contain the desired response (e.g., b is for ball), and worst for letter name mediators.

Word Recognition. Word recognition during reading of connected text can be achieved through visual cues, context cues, or letter-sound generalizations. A beginning reader depends heavily upon context cues and letter-sound generalizations, while the experienced reader uses mostly visual and contextual cues. Many reading problems result from the inability to utilize all of these cues properly. The most common word identification fault, reported in several cultures, is a failure to observe the complete word during identfication. Generally, only the beginnning of the word is examined. A similar phenomenon occurs among poorer readers in pronouncing words they have never seen before. Consonants with invariant pronunciations, like p and m, will be mispronounced as often as 50% of the times they are encountered in medial and final position, but in initial position, they are rarely missed.

The reliance on letter-sound generalizations in word recognition slowly decreases as word identification ability increases, and the mature reader probably makes little use of them in normal reading. Nevertheless, the ability to apply letter-sound generalizations continues to develop at least through eighth grade. Whether this is due to a continual reliance upon sounding out words or is a result of increasingly more efficient memory organization is not known. But

since the use of letter-sound generalizations appears to depend more upon examples stored in memory than upon storage of rules as such, improvement in memory organization probably accounts for a significant part of this development.

Stages of Reading

The child's initial attempts at reading involve multiple fixations on each word, frequent regressive movements of the eyes, and a painfully slow response time for recognizing words or assigning sounds to letters. Oral reading errors are frequent and at first show the influence only of oral language habits: the error is usually grammatically and semantically appropriate to the preceding portion of the sentence (Biemiller, 1968; Weber, 1970). Later in the first year, errors become predominately "no response"; later still, errors show the influence of both sentence context and letter-sound correspondence learning (Biemiller, 1968). By the end of first grade the average American child can read orally at a rate of about 45 words per minute (Durrell, 1940, p. 143) and makes somewhere between 15 and 16 fixations in silent reading for a 3.5-inch line (about one fixation for each pair of letters), with about four regressive movements per line (Buswell, 1922). (By this same time the average Finnish or Israeli child has learned all of the major letter-sound correspondences for his language and can pronounce most words which he encounters in reading--an ability which English speaking children only approximate by fourth grade.)

By fourth grade silent reading speed has overtaken oral reading speed (Durrell, 1940, p. 143), reading comprehension has overtaken listening comprehension for average difficulty material (Durrell, 1969), the perceptual processes used in scanning and fixating have made their most important development (Buswell, 1922) and some of the variable letter-sound patterns (for English) have been learned about as well as they ever will be (Calfee, Venezky & Chapman, 1969). While there is continual improvement, at least through the eighth grade, for all of these skills, this latter increase is nowhere as dramatic as the one between first and fourth grade.

Summary

1. The failure rate in learning to read, no matter how defined, appears to be over 15% of all normal children (i.e., children with no major physiological or mental deficiencies), for all countries which have been surveyed.

2. Neither the teaching method nor the teacher's experience has been shown to be a significant predictor of reading success. This does not show that these factors could not be important for reading success, only that at present they are not.

3. Although many children come to the reading task with ill-formed concepts of such entities as reading, word, sentence, and sound, they soon acquire a general notion of what reading is about. Even the poorest first grade readers make oral reading errors appropriate to the preceding linguistic context; that is, they are well aware of the general task of translating from writing to something that makes sense, even if

unable to verbalize the steps that they take in doing so.

4. The first four years of reading instruction are critical for the acquisition of most reading skills. Generally by fourth grade the most important development in scanning ability has taken place, silent reading speed has overtaken oral reading speed, silent reading comprehension has overtaken listening comprehension for average difficulty materials, and many letter-sound generalizations have been learned about as well as they ever will be. Comprehension difficulties, overshadowed by more basic skill requirements in early grades, begin to affect measured reading ability in third or fourth grade.

5. Mastery of the mechanics of reading--scanning, fixating, translating from letters to sounds, and recognizing words--does not guarantee mastery of the total reading process.

6. Poor performance in most perceptual factors, including scanning left-to-right and fixating, does not appear to be a major barrier to reading nor do slow articulation and phonemic discrimination development. The skills which are most important for acquiring the mechanics of reading and are also the most difficult to train before first grade are the skills involving the manipulation of meaningless sounds; in particular, segmentation, matching, and blending of sounds within words. In visual perception, the most difficult concepts to acquire involve order, orientation, and attention to the complete configuration. These skills are also those most crucial to letter-sound correspondence learning.

7. Regardless of how initial reading is taught--whether by whole words or by letters and sounds--letter-sound correspondences must be acquired. These relationships help mostly in building word recognition ability by giving the child a self-generated check on words whose identity he thinks he knows from visual features or context, but is not sure of, and a technique for identifying words which he does not recognize in printed form, but which may be in his listening vocabulary. In either situation, perfect translation from letters to sounds is not required--only enough to approximate the correct response. Other cues can then be used to complete the identification.

8. The acquisition of specific letter-sound correspondences appears to be heavily dependent upon the words which the child learns in the first few years of reading. Verbalization of rules or later introduction of examples is ineffective in altering patterns acquired during the initial reading process.

III

SELECTION OF READING SKILLS

Introduction

From the preceding discussion several skills can be designated which are by logical argument important for learning to read. However, from such evidence we cannot discern whether these are basic or composite skills, nor can we determine whether their absence can be detected at the kindergarten level. To resolve these questions, at least in part, we must consider kindergarten tests which predict later reading success. From the correlations obtained in relating specific skills at the kindergarten level with later reading success, a further delimiting of reading skills can be made.

Thus, if skill A is logically defined as important for reading, but its zero-order correlation with reading success is low, or if its first-order correlation with intelligence or some other factor partialed out is low, the skill probably is not important for reading (assuming that the test for the skill is valid). If, however, the skill is logically important and correlates significantly with reading success when other factors are partialed out, then it is a choice candidate for

instruction at the kindergarten level. But although both of these conditions--a logical connection with the reading process and a significant partial correlation with reading success--are necessary for selecting a skill, they do not guarantee that the skill is basic to reading. There may exist an underlying skill, untapped in the tests, which controls this (and other untapped) skills. In general, this possiblity will exist until it can be shown that teaching certain independent skills leads to an improvement in reading ability --and that this improvement centers on improvement in the skills taught.[11]

Skills which are good predictors of reading success, but are not logically related to learning to read, present a dilemma.[12] Either the skill is basic to the learning process and, therefore, there is a flaw in the model from which logical arguments are derived, or there is a more basic skill which the skill in question depends upon. Letter naming ability is one such demon; it consistently shows the highest single correlation with reading of the skills tested in predictive batteries, yet, logically, letter names are not needed

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[11] This latter requirement, as difficult as it is to evaluate, is essential. Without it we will not be sure <u>why</u> an improvement occurs and therefore will be hard-pressed to explain why the program fails with certain children--as it is sure to do--even under ideal conditions.

[12] Tests for predicting reading success are generally composed of two types of subtests: one taps specific skills, such as memory span, form matching, or auditory discrimination; the other taps non-skill variables like sex, age, teacher rating, or socioeconomic status. Only the first class has any diagnostic value for kindergarten programs.

for learning to read. We know from recent pilot studies that when certain visual and acoustic skills are partialed out, letter naming no longer correlates significantly with reading achievement.

Predictive Tests

There are a variety of predictor tests which can be given at the end of kindergarten or beginning of first grade (e.g., Metropolitan Readiness, Clymer-Barrett, Murphy-Durrell), but very few which can be used before the end of kindergarten.[13] The most important of the latter group are the Wilson-Flemming Symbols Scales, the deHirsch et al. Predictive Index, and the Basic Prereading Skills Tests being developed at the Wisconsin R & D Center.[14] (Since instruction during kindergarten is central to the program proposed here, skill deficits detected later than the middle of kindergarten are of no interest to our work.)

Wilson-Flemming. The Wilson-Flemming Symbols Scales (Wilson & Flemming, 1939) consists of nine subtests for letter naming, letter and digit writing, and sound recognition and production (see Table 1). The tests were normalized on 217 high-IQ children for both the fall and spring of kindergarten through grade three. Correlations between the subtests (total score) and later reading success as measured by standard reading tests range from .57 (third grade) to .75 (first

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[13] The 1961 edition of Tests in Print (Buros) lists 18 tests which could be used for predicting reading success. Of these, about six could be used before the end of kindergarten.

[14] The Stanford Early School Achievement Test, Level I, is normed for entering kindergartners but intended for use as an achievement test; no correlations with later reading are reported.

grade). Even with mental age held constant these correlations remain high. Intercorrelations among the skills are not given and the test apparently was not developed beyond its 1939 form.

Predictive Index. The de Hirsch et al. Predictive Index (de Hirsch et al., 1966) consists of ten tests, selected from 37 tests which were given to 53 kindergarten children (apparently around the middle of kindergarten). Standard reading and spelling tests were given at the end of grade two, correlations between the 37 kindergarten tests computed, and finally the subtests which as a group best identified children who failed in reading and spelling were selected.[15] By this method, the Predictive Index Test correctly identified 91% (10 out of 11 children) of those who were failing reading by the end of second grade, but incorrectly predicted failure for four children who did not fail. Selecting on an ad hoc basis the best 10 of 37 tests, however, inflates the predictive capability of such a battery. There is a replication now underway by de Hirsch et al. on 200 subjects. A replication by Zaeske (1970) is not relevant here since he tested sub-skills at the beginning of first grade and reading abilities at the end of that grade.

The tests included in the Predictive Index range from Pencil Use through Word Production, but do not include letter naming (see Table 1).[16]

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[15] The selection procedure for subtests was ad hoc; multiple regression analysis was not used to confirm the selections. Correlations of the 10 tests with second grade reading ranged from .26 to .48, all statistically significant ($p < .05$).

[16] Letter naming was the single best predictor of reading success, but for reasons not explained, it was administered to only one-half of the kindergarten population and on this basis excluded from the Predictive Index.

Table 1

Subtests for Predicting Reading Success

Wilson-Flemming	de Hirsch *et al.*	BPST (1969)
Naming Capital Letters	Pencil Use	Rhyming
Naming Lower Case Letters	Bender Visuo-Motor Gestalt	Word Memory Span
Giving Letter Sounds	Wepman Auditory Discrimination	Alphabet Production
Recognizing Consonant Sounds	Number of Words used in a Story	Alphabet Recognition
Recognizing Short Vowel Sounds	Categories	Letter Matching
Printing Capital Letters	Horst Reversals	Auditory Segmentation
Printing Lower Case Letters	Gates Word Matching	
Writing Digits	Word Recognition (2)	
Giving Phonics Combinations	Word Production	

There is no overlap of the Predictive Index with the Wilson-Flemming Symbols Scales. Since multiple regression was not used in this study, the multiple correlation of the ten subtests with reading scores is not available, nor is the contribution of each subtest to the total prediction percentage. But more limiting for the present purposes are, first, that no intercorrelations among skills are reported, and second, that several of the subtests (Pencil Use, Bender Visuo-Motor Gestalt and Categories) have no direct relation to reading. An additional skill, Auditory Discrimination, has a specious relationship, as discussed earlier (pp. 9-10). Four of the subtests are measuring logically related skills likely to be highly intercorrelated: Horst reversals, Gates word matching, and word recognition (two tests). A fifth test, word reproduction, is based upon the two word recognition tests.

BPST. The Basic Prereading Skills Test is being developed at the Wisconsin Research and Development Center as part of an on-going study of the reading process. It was designed as an experimental instrument to be used at the beginning of kindergarten to diagnose reading skill deficits, but has also proven to be a relatively good predictor of reading success. In its 1969 form the test package contained the following subtests: Alphabet Production, Alphabet Recognition, Word Memory Span, Rhyming, and Letter Matching. Means and intercorrelations for each subtest are shown in Tables 2 and 3 for a sample of 72 children tested at the beginning of the kindergarten

Table 2

Performance Data on BPST, N = 72

	% Per S	Mean Per S	Standard Deviation
MATCHING			
Single Letter, Errors	21%	2.11	1.133
Letter Pair, Errors	63%	3.14	.877
Letter Group, Errors	79%	5.54	1.221
Total Errors: Pairs + Groups	72%	8.68	1.814
ALPHABET PRODUCTION			
Correct	20%	5.11	8.125
ALPHABET RECOGNITION			
Correct	14%	3.76	6.497
WORD MEMORY SPAN			
List 1, Correct	---	3.85	.816
List 2, Correct	---	3.58	.868
Total Correct	---	7.43	1.452
RHYMING			
Correct	32%	2.53	2.926
SEGMENTATION, First List			
Trials 1-5, Correct	23%	3.39	3.833
Trial 5, Correct	29%	.88	1.112
Transfer, Correct	5%	.28	.736
SEGMENTATION, Second List			
Trials 1-5, Correct	19%	2.85	4.110
Trial 5, Correct	20%	.61	.987
Transfer, Correct	4%	.24	.702

Table 2 (cont.)

	% Per S	Mean Per S	Standard Deviation
SEGMENTATION			
Correct + phonologically related, T5, + transfer, both lists	28%	5.00	5.617

Table 3

Correlations Among the Basic Prereading Skills Tests[a]

(N = 72; BPST administered to entering kindergarteners)

		2	3	4	5	6	7
1.	Age in months	.107	.043	.165	-.281*	-.120	-.055
2.	Matching--Letter Pairs + Groups, errors		-.309**	-.481**	-.236*	-.134	-.265*
3.	Alphabet Production, correct			.559**	.204	.322**	.199
4.	Alphabet Recognition, correct				.233*	.267*	.395**
5.	Word Memory Span, correct					.157	.317**
6.	Segmentation, List 1 Trials, correct						.457**
7.	Rhyming, correct						

[a]Pearson Product-Moment Correlation Coefficients

* $p < .05$, $r > .23$, $df = 70$, 2-tailed

** $p < .01$, $r > .30$, $df = 70$, 2-tailed

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year. For an administration of a previous version, a linear regression analysis showed a multiple correlation coefficient of .75 ($p < .01$) for letter matching and acoustical segmentation with first grade word discrimination, using a population of 19 children drawn from one school.[16] Both skills contribute significantly to the multiple correlation with reading. The intercorrelations of those scores are shown in Table 4.

The Basic Prereading Skills Test is now being revised for further normalization and validation. The new battery will consist of two test areas: visual processing and acoustical processing, with three tests in each area.

Interrelationships of BPST Skills. As indicated previously, the skills of letter matching, rhyme production, and segmentation appear to be relatively independent of one another. In general, previous work has shown visual and acoustic skills to be unrelated to one another or to share only 10 to 15% of their variance (Calfee, Chapman, & Venezky, in press).

Whether or not the specific subskills identified for visual and acoustic matching are uncorrelated among themselves remains to be determined. Some evidence is available on the interrelationships of orientation, order, rhyming and segmentation. Since the subskill tests show residual association significant for large samples, it is of interest to examine the pattern of that association for children performing very successfully or very poorly on a subtest. Distribution

[16] Word discrimination was measured by the Metropolitan Achievement Test.

Table 4

Intercorrelations and Means of Selected Basic Prereading Skills Tests and the Word Discrimination Test of the Metropolitan Achievement Test

(N = 19; BPST administered in mid-kindergarten)

	2	3	Mean % Correct
1. Matching (correct)	.30	.54*	50
2. Segmentation		.65**	26
3. Word Discrimination (adjusted raw score)			--

* $p < .05$, $df = 17$, 2-tailed

** $p < .01$, $df = 17$, 2-tailed

of scores among Ss from a fall, 1969, administration of the BPST to 72 kindergartners is presented in Table 5.

Let successful test performance be arbitrarily defined as better than 80% correct, and poor performance be defined as performance no better than chance. Then it can be asked whether the child who does exceptionally well on any one subtest does well on all of them, or whether the child doing exceptionally poorly on a subtest does poorly on all others. This is essentially the question of whether the residual correlation is provided by higher correlations at the two extremes of score distribution. The data are presented in Table 6 for rhyming, segmentation, order, and orientation subtests. Almost half or more of the children failed on each of these tests, but only 15 of 72 entering kindergartners failed all tests. From 2 to 20 children met the mastery criterion; no child, however, showed mastery of all four tests. Most children meeting mastery criterion for a test did so on only one test; most children failing at least one test failed two or three.

Children were relatively evenly distributed in the particular combination of tests failed or mastered. The data from Table 6 indicate that patterns of test deficit can vary markedly even at the extremes of test performance, as one would expect with demonstrably independent skills. In particular, the data suggest that order and orientation confusions may be only partially related; similarly for rhyming and segmentation. The unconditional probability of failing

Table 5

Distribution of Ss by Test Scores

(N = 72; BPST administered at beginning of kindergarten)

Alphabet Recognition (26 items)		Single Letter Matching (10 items)		Letter Matching: Orientation (pbq only)		Letter Matching: Order (12 items)		Rhyme Production (8 items)		Segmentation: Trial 5 & Transfer (18 items)	
Number Correct	Number Ss	Number Correct	Number Ss	Number Correct	Number Ss	Number Correct	Number Ss	Number Correct	Number Ss	Number Correct	Number Ss
0	24	0	0	0	20	0	0	0	34	0	31
1	18	1	0	1	25	1	5	1	6	1	9
2	9	2	0	2	22	2	20	2	2	2	9
3	3	3	0	3	5	3	23	3	3	3	5
4	3	4	1	--	--	4	13	4	3	4	5
5	2	5	1	--	--	5	4	5	7	5	6
6	1	6	3	--	--	6	3	6	8	6	2
7	0	7	20	--	--	7	2	7	4	7	3
8	2	8	27	--	--	8	0	8	5	8	1
9	1	9	15	--	--	9	0	--	--	9	0
10	0	10	5	--	--	10	1	--	--	10	0
11	1	--	--	--	--	11	1	--	--	11	1
12	1	--	--	--	--	12	0	--	--	12	0

Table 5 (cont.)

Alphabet Recognition (26 items)		Single Letter Matching (10 items)		Letter Matching: Orientation (pbq only)		Letter Matching: Order (12 items)		Rhyme Production (8 items)		Segmentation: Trial 5 & Transfer (18 items)	
Number Correct	Number Ss	Number Correct	Number Ss	Number Correct	Number Ss	Number Correct	Number Ss	Number Correct	Number Ss	Number Correct	Number Ss
13	1	--	--	--	--	--	--	--	--	13	0
14	0	--	--	--	--	--	--	--	--	14	0
15	0	--	--	--	--	--	--	--	--	15	0
16	0	--	--	--	--	--	--	--	--	16	0
17	0	--	--	--	--	--	--	--	--	17	0
18	0	--	--	--	--	--	--	--	--	18	0
19	1	--	--	--	--	--	--	--	--	--	--
20	0	--	--	--	--	--	--	--	--	--	--
21	0	--	--	--	--	--	--	--	--	--	--
22	2	--	--	--	--	--	--	--	--	--	--
23	1	--	--	--	--	--	--	--	--	--	--
24	0	--	--	--	--	--	--	--	--	--	--
25	1	--	--	--	--	--	--	--	--	--	--
26	1	--	--	--	--	--	--	--	--	--	--

Table 6

Distribution of Ss Failing or Meeting Mastery Criterion on Each of Four Tests (Hawthorne F69 data; N = 72)

	FAILING: Chance performance or below		MASTERING: Better than 80% correct	
Rhyme[a]	34		9	
Segmentation[b]	49		4	
Order[c]	48		2	
Orientation[d]	45		20	
All Four Tests	15		0	
Three out of Four Only	22		2	
R-S-Ord		7		0
R-S-Orient		5		0
R-Ord-Orient		2		2
S-Ord-Orient		8		0
Two out of Four Only	20		5	
R-S		3		1
R-Ord		0		0
R-Orient		1		3
S-Ord		4		0
LG-SL-Ord-Orient		9		0
S-Orient		3		1
One out of Four Only	10		19	
R		1		3
S		4		2
Ord		3		0
Orient		2		14

[a]Criterion for failure was 0 correct rhymes; for mastery, 7 or 8 correct rhymes.

[b]Criterion for failure was 2, 1, or 0 correct on last trial of each two segmentation learning tasks; for mastery, 5 or 6 correct.

[c]Criterion for failure was 3 or fewer correct matches; for mastery, 10 to 12 correct matches.

[d]Criterion for failure was 0 or 1 correct on the single letter subset pbq; for mastery, 9 or 10 correct on the entire single letter test.

the segmentation test is .68; that of failing rhyming, .47. Given that the child has failed rhyming, the conditional probability of failing segmentation is .44; given that segmentation has been failed, the conditional probability of failing rhyming is .31. A similar pattern emerges for the order and orientation data; unconditional probabilities of failure are .67 and .62, respectively. The conditional probability of failing on letter groups, given single letter failure, is .47; and vice versa, .40. As skill subtests are developed and field tested, data on zero-order and partial correlations will be obtained.

The data gathered up to this point argue strongly for the independence of specific skills. There are two important consequences to this finding. The first is that the best single-test predictors of reading achievement are of relatively little use in determining an intervention program for an individual child. The child's pattern of skill deficits must be determined separately for each skill, since a deficit in one skill does not imply deficits, or lack of them, in other skills. The theoretical corollary to this finding is the contradiction of the popular assumption that reading readiness is a single, global factor, with its often attendant consequence of consigning unprepared children to failure. Rather, the data speak to the necessity of specific skill assessment and formal instruction in deficit skills.

Summary

From the various skill areas identified as relating to initial reading, the two that predictive tests show to be most closely related to reading success are visual matching and acoustical processing. These same skills also appear to underlie many other variables which correlate significantly with reading success, like letter naming. Predictive tests, and especially the Basic Prereading Skills Test, also demonstrate that deficits in these skill areas can be detected early in the kindergarten year. The question of how these skills might be taught in kindergarten is discussed in the next section.

IV

PROPOSAL FOR A DEVELOPMENT PROGRAM

Introduction

In the foregoing review, the skills identified as important for early reading achievement were those associated with symbol and symbol-string matching and recognition and those associated with analysis and synthesis of phonological information--here designated as letter and sound skills. The proposal for development of an instructional program described in this chapter concentrates on these two skill areas.[17]

Before outlining the development plan for instructional materials, the two skill areas and their interrelationships will be reviewed in detail. In the previous chapters, the relation of

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[17] In earlier research, a number of other candidate skills (e.g., articulation, speech sound discrimination, object matching, category sorting, paired-associate learning, letter naming, serial word memory span, memory for syntactic structure, and vocabulary) were investigated and discarded when no relation to reading could be confirmed or when more specific skills could be shown to account for the same variance as a single general predictor (e.g., letter naming, vocabulary). Many of the findings are reviewed in Calfee, Chapman, & Venezky (in press).

letter and sound skills to reading achievement was discussed; here available evidence for skill deficits in kindergartners, the sources of deficit, and the teachability of skills will be presented.

Letter Skills

Order and Orientation Deficits. It has long been recognized that both prereaders and poor readers make mistakes in matching letters and letter sequences (e.g., Davidson, 1934, 1935; Gibson, Gibson, Pick, & Osser, 1962; Orton, 1925; Smith, 1928).

The data from studies of single letter matching, if not always their interpretation, make clear that the characteristic error is a confusion of two symbols identical except for orientation; confusions of p, q, b and d in the case of letters (see Benton, 1959; Fellows, 1968; and Howard & Templeton, 1966, for reviews). In the typical array for letter-matching, left-right orientation errors predominate. Calfee, Chapman, and Venezky (in press) have confirmed this finding for letter-matching in kindergartners; visually similar letters, in contrast, present little difficulty.

A fact almost as often noted is that children will characteristically confuse ab with ba in matching letter sequences--this despite a widely held belief that children match letter sequences on the basis of total configuration. Studies indicate that it is not simple order reversal, but any permutation of a letter sequence, which is distracting (Calfee et al., in press; Chapman, in preparation).

Among kindergartners, orientation and order confusions appear

to be the rule rather than the exception; in the studies just cited, 93% of entering kindergartners (N = 72) made at least one orientation error and 96% made at least one order reversal error. These two categories accounted for 70% of the errors made, despite the opportunity to choose visually similar or partially identical alternates. The proportion of kindergartners making such matching errors may be lower for high ability groups (the data reported are from a heterogeneous middle to lower-middle class school); nevertheless it is clear that many prereaders have difficulty in matching letters and letter sequences.

Do children fail to perceive differences in orientation and order, or do they fail to take the observed differences into account? The answer appears to be the latter: a difference in orientation of a letter or ordering of a set of letters is not a significant difference for the child, although he sees the difference. Robinson and Higgens (1967) have demonstrated that children making left-right reversals can readily report the direction of each letter. A similar finding for order is reported by Chapman (in preparation), who showed that entering kindergartners consistently choose the correct match when further pressed to choose either the correct item or one identical to it except for letter order.

When the child is required to choose a letter or letter group match after the standard has been removed, the error distribution indicates that information about orientation and order is no longer

available to most children; chance error rates are observed when the distractors consist only of orientation or order changes.

The problem, then, is conceptual rather than perceptual: a sequence of letters is treated by many nonreaders as a collection of objects, equivalent to another letter sequence (collection of objects) if the same elements are present, regardless of the orientation and ordering of the elements.

Position Detail Deficits. One further problem in the processing of visual information is revealed by letter-sound correspondence studies in older (second grade) children: the poorer readers do not appear to attend closely to letter identity in noninitial position. Although the poorer readers pronounced correctly almost 90% of the invariant consonant letters (that is, letters which have at this level only one pronunciation) appearing in initial position, they mispronounced 35-45% of the same letters in final and medial position. The source of this problem is not yet clear; it may be lack of response inhibition (Kagan, 1965), inattention, or simply failure by the child to set an appropriate criterion level for identification (i.e., failing to recognize that other words have the same initial letters).

Evidence for Teachability. Given that many kindergartners will show skill deficits in matching b, d, p, q, in matching letter sequences, and in attending to noninitial letters, would it be sufficient to simply tell them the special rules when a matching task is presented? The answer appears to be no (Calfee, Chapman,& Venezky, in press; Chapman, in preparation). Explanation, exhortation, and feedback are insufficient to change the child's normal matching strategy. Efforts to train attention to orientation (e.g., Harris, 1969; Hendrickson & Muehl, 1962; Jeffrey, 1958; Strang, 1967) show indifferent success with motor training or verbal elaboration. Clear success has been reported, however, when a rationale is conveyed operationally (Caldwell & Hall, 1969). Caldwell and Hall gave kindergartners a clear plastic overlay with symbols drawn on it and instructed them to match a target with one of several differently-oriented alternates either by (a) showing that the overlay, without turning, fitted both or (b) showing that the overlay could be turned in such a way as to fit both. The first group showed few orientation reversals on an immediate posttest; the second group, a sharp increase. Neither this study nor others, however, have investigated long-term retention arising from instruction.

Instructional Tasks to be Investigated. It is our working hypothesis that successful instructional procedures for attending to order, orientation, and noninitial position can be found. Further, we hypothesize that the procedures most likely to yield transfer to reading are those tasks which can be solved only by attending to order and

orientation for all positions. One such task has already been shown to be successful for orientation; similar template tasks could be constructed for order. Since retention of order and orientation is required only for symbolic tasks, it would appear that little transfer of learning to reading could be expected unless (a) practice is massive and/or (b) instruction is given in close proximity in time to early reading instruction. The former case would require tasks with high intrinsic motivation for the child and minimal teacher supervision, such as small group or individual games which require that the requisite information be processed in order to play them.

The program of visual skill instruction to be developed will be designed to teach the child to attend to orientation information in initial, final, and medial position and order information in initial, final, and medial permutations. Tasks will be sequenced by difficulty: (a) from immediate to delayed matching and (b) from initial to final to medial positions. Games will be developed for order, orientation, and position detail which can be played with increasingly difficult sets of materials.

Each of the tasks will be assessed to assure that the games are simple enough for unsupervised play in kindergarten. The success of each as an instructional procedure will be measured by criterion matching tasks already developed for orientation, order, and position detail.

Sound Skills

Evidence for Deficits. In contrast to research on letter skills, very little research on the kindergarten-aged child's ability to analyze phonological information is available. Those studies which have assessed the prereader's ability to isolate initial sounds, match words with the same sounds (initially or finally), rhyme, or blend sounds into words find little evidence for the presence of these skills before the age of seven (e.g., Bruce, 1964; Chall, Roswell, & Blumenthal, 1963; Elkonin, 1963; Kamm & Chapman, in preparation; Wilder, in preparation; Zhurova, 1963).[18]

In particular, Roswell and Chall (1963) accept a meager seven successful blending trials out of 30 as adequate performance for beginning first graders (e.g., given spoken stimulus /bə-i/, a child must respond /bi/). Bruce (1964) found no children of mental age five or six able to say what word would be left if a particular sound was taken away. Calfee, Chapman, and Venezky (in press) found that yes-no judgments of rhyming word pairs or of pairs beginning with the same initial sound constituted invalid tasks for kindergartners. A more appropriate rhyme production test showed that only half the mid-year kindergartners could rhyme. Of 72 entering kindergartners,

[18]Auditory or speech sound discrimination, for which a substantial body of research literature exists, is omitted from consideration on the basis of project research (Rudegeair, 1970; Rudegeair & Kamil, 1970) showing methodological flaws in previous testing procedures and negligible error rates on the task when these flaws are corrected.

90% failed to score at least 6 out of 18 correct on a segmentation learning task.[19]

Insofar as valid testing procedures can be developed, then, kindergarten children demonstrate little ability to attend to phonological relations among word segments, little ability to isolate and produce sound segments in words, and very little ability to synthesize words from component sounds. The problem of developing valid testing procedures for sound skills in kindergartners is a serious and continuing one, even if the preceding generalization is accepted, for the assessment of instructional procedures depends upon such criterion tests.

Sources of Deficit. Tasks requiring phonemic segmentation and synthesis have few counterparts in the child's previous experience. Although most kindergarten children can use the full phonemic system of English in speaking and listening (with meaningful discourse), they have little experience in retrieving or using meaningless single sounds.

For letter matching, we concluded that deficits resulted from a failure to attend to the information required by reading rules; for sound skills, we hypothesize that the main deficit is in the retrieval and manipulation of single sounds, and not the recognition, storage, or production of them. To support this conclusion we can point first

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[19] Each child received five trials on two three-item lists of the form "If I say pies, you say eyes" and "If I say chief, you say -ief"; the fifth trial for each list was followed by a transfer test of six new CVC stimuli. A 0 to 18 score was based on the two final and transfer trials.

to the great difficulty of solving tasks which involve sound manipulations (e.g., segmentation, rhyme production, blending) and the relative ease of learning concrete responses to nonsense sound stimuli but not the reverse. Kindergartners can be taught to point to an appropriately colored block, given a single phoneme stimulus, with relative ease, although no transfer of this learning to syllabic presentation of the phonemes can be demonstrated (e.g., learn red block to /p/, blue block to /o/; test transfer by presenting /po/) (Kamm & Chapman, in preparation).

In short, children can give already acquired responses to nonsense or single sound stimuli, but they do not appear able to retrieve or arrange these same stimuli as responses. Second, we can point to experimental data which show that children can produce single sounds as responses in an imitation task (Marsh & Sherman, 1970b). Third, we can invoke observations on the ease with which children acquire meaningless single sound responses when they are meaningfully associated to stimuli, as for example the noise which animals and other sound producers make (e.g., the snake goes /s/).

Evidence for Teachability. From informal observation, the evidence is substantial that sound manipulation skills can be taught, but most experimental studies reach the opposite conclusion.[20] Russian investigators (Elkonin, 1963; Zhurova, 1963) have reported successful tech-

[20] This evidence derives mostly from reading programs in which five year olds are taught to read (England and some kindergartens in Israel). Teaching single sound responses for letters, especially with mediators, is not impossible.

niques for training certain phonologically-based tasks, but attempts to replicate these findings with American kindergartners have failed (Wilder, in preparation; Kamm & Chapman, in preparation). Rote association of initial sounds with stimulus words could be taught through sheer force of repetition, but no transfer, even to new words beginning with the same sounds, was found. McNeill and Stone (1965) report nonsense word stimuli to be more effective than real word stimuli when the kindergartner is asked to decide whether a given stimulus contains /s/ or /m/; greater transfer was observed for nonsense word training as well. Error rates (corrected for guessing) were 36% and 56% on the 24-item training lists, revealing not only the superiority of nonsense stimuli but also the difficulty of either task.

Phonologically-based tasks for prereaders fare no better when training takes place in the context of letter-sound association learning (Calfee, Chapman, & Venezky, in press; Jeffrey & Samuels, 1967; Marsh & Sherman, 1970a; Silberman, 1964). Little positive transfer can be demonstrated from learning a list of two-letter stimuli systematically related to CV (or VC) responses to learning a single symbol-single sound task, nor is positive transfer found in the reverse direction. Morever, the tasks prove extraordinarily difficult.

Instructional Tasks to be Investigated. Instructional tasks will be developed for teaching children single sound responses to objects which produce these sounds. Once a set of such pairs is learned, two directions will be followed. In one, tasks which require manipu-

lations of single sounds (sound matching and substitution, blending, segmenting) will be developed, using the picture props. In the other, letters of the alphabet will be introduced as stimuli for the objects, and eventually the objects faded out, so that the sound responses are attached directly to the letters.

Instructional procedures will be tried first for the tasks of sound matching, substitution, segmenting, and blending; the introduction of letter-sound instruction will be contingent on mastery of the preceding skills. Pilot field testing of a selection of subskills and instructional procedures will begin in spring, 1971. Longitudinal follow-up of first grade reading achievement will provide data for multiple regression analysis of the subskills and permit selection of these specific subskills which contribute significantly to the regression equation for reading achievement.

Outline of Development Program

In the preceding section we have argued the need for teaching specific letter and sound skills to kindergartners and reviewed evidence which indicates that they might be taught successfully. In what follows, we outline a plan for a kindergarten program providing individualized instruction and assessment in letter and sound skills. Specifications for the instructional and test components are described separately in the text for clarity, although they are interdependent.

Target Population. Prereaders or beginning readers showing reading skill deficits, ages 4-7. (Primarily children enrolled in kindergarten; secondarily, those enrolled in preschool or transitional classes.[21]) Excluded: non-English-speaking children.

Purpose. To teach selected prereading skills prior to reading instruction, in order to reduce the number of children failing to learn to read by the end of first grade.

Instructional Tasks. Visual Skills: Letter order, letter orientation, and letter position detail. Acoustic skills: Sound matching and substitution, sound segmentation, sound blending, and symbol-sound association.

Management Components. (a) The Wisconsin Basic Prereading Skills Test (in preparation) for assessing mastery of the skills cited; (b) individual record forms and teachers' manuals.

Materials and Equipment. All special materials and equipment will be included with the WBPST. These will include a teacher's manual or handbook and teacher's log for individual records, and for each skill, materials and equipment for: (a) introducing concept or task to entire class; (b) small group activities (2-6) children), requiring only occasional monitoring by teacher; (c) individual activities, with or without teacher participation. The group activities are mostly games, using card decks, boards, pictures,

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[21] According to statistics cited in the Introduction, the target population will include a disproportionately large number of children from lower SES levels.

and other inexpensive and reusable materials. The individual activities include some of the materials just named, plus generally available equipment such as a tape recorder or slide projector.

Administration. (a) Teacher introduces first task to whole class and then demonstrates small group activity to them. (b) All children work in groups; teacher monitors groups and also introduces each group to individual work. Children having trouble working in groups begin individual work with teacher's assistance. (c) Children doing well are tested individually. If they pass criterion they are given supplementary work until the teacher is ready to introduce a new skill. This might be when enough children have reached criterion to form a group, or when some larger percentage of the class has reached criterion. Slower children may work at two skills (alternating days for each skill), or may stop working on a skill before they reach criterion, and return to it after working with other skills. The teacher's handbook and log will outline these options and provide a record-keeping system for each.

Time Required. This program is intended for a full kindergarten year, but since certain skills (or groups of skills) are independent of each other, it could be used for only a semester--or even less--through the elimination of a segment of the program. It will require approximately one-half hour per day, five days a week, but with

supplementary materials could be used for two sessions of one-half hour each per day. Kindergartens with more advanced children may need only three days each week of instruction. The determinant of time invested by each child is his individual pattern of deficits and rate of learning.

Development. Assessment and selection of visual and acoustic instructional procedures continues in fall, 1970 in two kindergarten classes. When a successful training procedure has been developed for K-level children, it will be assessed for use with preschool groups (ages 4-5). Should the instructional program prove feasible for younger children, evaluative data will be obtained for preschool groups in 1974 and 1975. Visual and acoustic components will be completed by fall, 1974.

Evaluation. Evaluation of the instructional tasks is an integral component of the development plan. In addition to the quality verification of the entire training program, there will be ongoing formal and informal evaluation as follows:

Formal:

1. the review, each summer (including summer, 1970), of the set of specific skills selected for test and training, through multiple regression analysis of the relation of subtests to reading achievement scores
2. the yearly assessment of the success of each instructional activity through administration of the most recent

WBPST version for that skill

3. an experimental assessment of the positive transfer to reading yielded by sets of instructional tasks (e.g., the current version of visual instructional activities).
4. after initial program development, evaluation of instructional components for use with younger children and, possibly, older remedial readers.

Informal: Interviews with teachers and administrative personnel assessing:

1. the management components
2. instructional tasks
3. degree of children's interest in program components.

Competition. K-level or preschool-level programs to teach set of skills cited--none; general readiness programs--Sesame Street; Engelmann-Bereiter (SRA Distar); Montessori; SWRL (in development but includes reading); Pittsburgh (in development); Early Childhood (in development); Appalachian Lab (in development; teaches reading).

Wisconsin Basic Prereading Skills Test (WBPST)

Purpose. (a) To diagnose reading skill deficits at the beginning of K; (b) to predict first grade reading ability at either the beginning or end of K.

Administration. Individual; approximately 15 min. per child to be given by teacher, reading specialist, or teaching aide.

Equipment Required. Printed materials only (instructions, score sheets, etc.).

Scoring. Done by test administrator by reference to answer sheet and predictive index.

Components.

Visual Skills	Acoustic Skills
order	matching & substitution
orientation	segmentation
detail	blending

Competition. Predictive test (or diagnostic), beginning of K--none; end of K--MRT, Murphy-Durrell, and others.

Development. Testing will begin in fall, 1970; a complete package will be ready by fall, 1974, including data on:

1. correlation with reading success and a predictive index
2. reliability
3. norms for beginning and end of K
4. intercorrelations of subtests and correlations with MRT.

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